



OVERVIEW INTERFEROMETRIC POINT SENSORS

Ultra-precise thickness measurements
from 2 μm - 12,600 μm

Measurement of all infrared-transparent materials
with rough, reflective or opaque surfaces

Sensor technology suitable for harsh industrial
environments, even for measurements in liquids
such as water, oil or acids

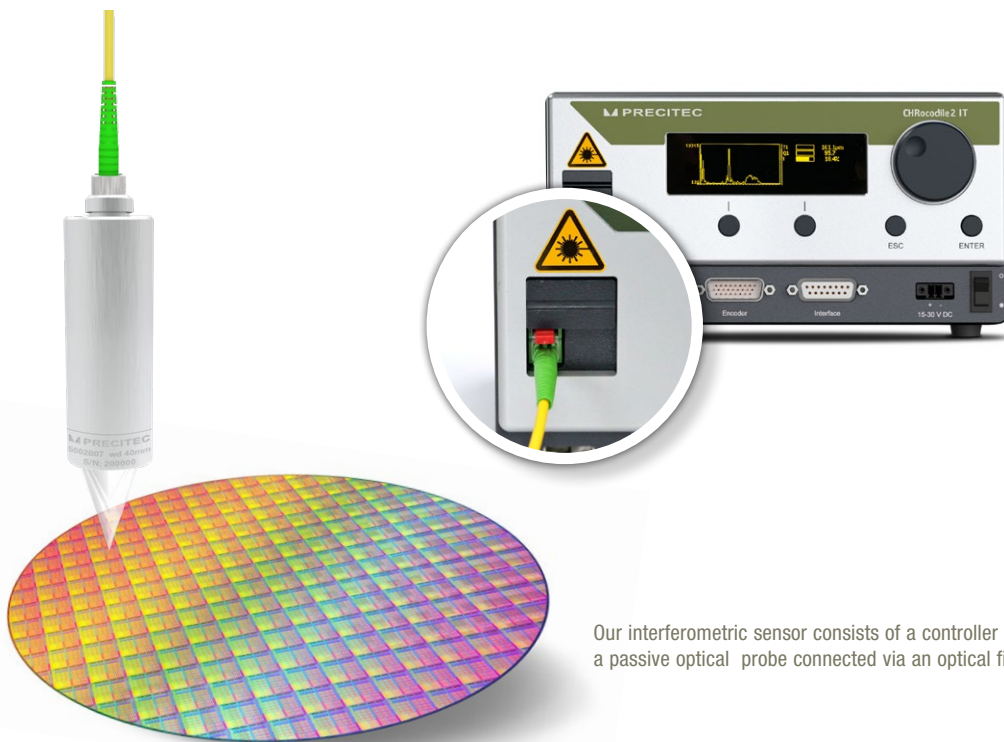
Insensitive to heat, humidity or vibration

Ideal for high speed inline inspections up to 70 kHz

DISTANCE

THICKNESS

TOPOGRAPHY



Our interferometric sensor consists of a controller and a passive optical probe connected via an optical fiber

MULTIFUNCTIONAL INTERFEROMETRIC SENSORS

Precitec Optronik's high resolution coaxial interferometric point sensors enable non-contact measurements of distance and thickness in a measuring range up to 12,600 µm. Due to their nanometer resolution, they are also used for measuring microstructures, for instance on wafers. Furthermore, the thickness of multiple individual layers can be determined simultaneously in one measurement.

Our optical measuring technology offers quality control for infrared transparent materials such as rough, doped & highly doped wafers, semi-transparent and opaque plastics, glass, coatings and adhesives.

Optronik's interferometric sensors with their small and compact footprint are easy to integrate into high-end measuring machines and difficult-to-access areas. Due to the non-contact technology, there is no need for maintenance or replacement.

The DLL developed by Precitec Optronik provides an universal interface for integrating CHRocodile devices. For specific sensor requirements, feel free to contact us regarding a customized solution.



Measuring the thickness of multilayer plastic foils

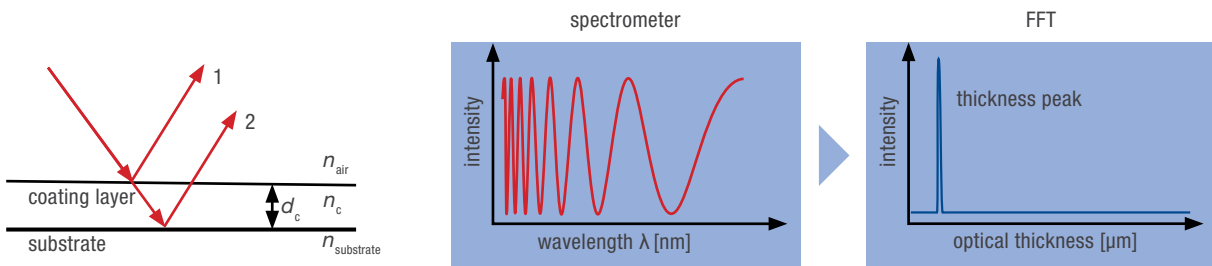
INFRARED LIGHT INTERFEROMETRY

CHRocodile UNIT	measuring rate	measuring range ¹⁾	axial resolution	item number	note/ main application
CHRocodile 2 IT 400	up to 70,000 Hz	29 µm - 3200 µm	1 nm	5009506	wafer and polished surfaces
CHRocodile 2 IT 500	up to 70,000 Hz	38 µm - 4300 µm	1 nm	5007391	wafer and polished surfaces
CHRocodile 2 IT 1000	up to 70,000 Hz	66 µm - 7500 µm	2 nm	5007546	wafer and polished surfaces
CHRocodile 2 IT 1300	up to 70,000 Hz	87 µm - 10500 µm	3 nm	5009529	undoped wafer and multi-layer structures
CHRocodile 2 IT 1700	up to 70,000 Hz	114 µm - 12600 µm	4 nm	5010786	undoped wafer and multi-layer structures
CHRocodile 2 IT RW 500	up to 70,000 Hz	44 µm - 4900 µm	1.5 nm	5007389	rough wafer and surfaces
CHRocodile 2 IT RW 1000	up to 70,000 Hz	57 µm - 6400 µm	2 nm	5007547	rough wafer and polished surfaces
CHRocodile 2 IT DW 250	up to 70,000 Hz	15 µm - 1800 µm	1 nm	5007388	doped and highly doped wafers, multi-layer structures, measurements in liquids
CHRocodile 2 IT DW 500	up to 70,000 Hz	29 µm - 3100 µm	1 nm	5009792	doped and highly doped wafers, multi-layer structures
CHRocodile 2 IT DW 1000	up to 70,000 Hz	66 µm - 7600 µm	2 nm	5010253	doped and highly doped wafers, multi-layer structures
CHRocodile 2 IT HDW 250	up to 4,000 Hz	15 µm - 1800 µm	1 nm	5009667	doped and highly doped wafers, multi-layer structures
CHRocodile 2 IT HDW 500	up to 4,000 Hz	29 µm - 3100 µm	1 nm	5009793	doped and highly doped wafers, multi-layer structures
CHRocodile 2 IT HTW ²⁾	up to 4,000 Hz	4 µm - 300 µm	1 nm	5010580	thin wafer, external light source
CHRocodile 2 LR	up to 66,000 Hz	16 µm - 2600 µm	1 nm	5007393	coatings, films, dark glasses
CHRocodile 2 K ³⁾	up to 4,000 Hz	15 µm - 1500 µm	5 nm	5100171	plastics, blown films

¹⁾ optical length | ²⁾ CHRocodile 2IT HTW: light source - halogen lamp | ³⁾ CHRocodile 2 K: linearity - 6.6×10^{-4} x upper measuring range limit

OPTICAL PROBES

measured value	distance, thickness			
working distance ¹⁾	40 mm	40 mm	100 mm	100 mm
lateral resolution	CHRocodile 2 IT HTW: 30 μ m CHRocodile 2 IT LR: 3 μ m	CHRocodile 2 IT 500 1000 1300 1700 400: 5.5 μ m CHRocodile 2 IT RW 500 RW1000: 6.2 μ m CHRocodile 2 IT DW 250 DW 500 DW 1000 HDW 250 HDW 500: 3.7 μ m	CHRocodile 2 IT HTW: 75 μ m CHRocodile 2 IT LR: 7.5 μ m	CHRocodile 2 IT 500 1000 1300 1700 400: 14 μ m CHRocodile 2 IT RW 500 RW 1000: 16 μ m CHRocodile 2 IT DW 250 DW 500 DW 1000 HDW 250 HDW 500: 9.3 μ m
numerical aperture	0.1	0.1	0.04	0.044
measurement angle to surface 90° ²⁾	$\pm 5^\circ$	$\pm 5^\circ$	$\pm 2^\circ$	$\pm 2.5^\circ$
dimensions (without fiber connector)	l = 58 mm d = 15 mm	l = 48 mm d = 15 mm	l = 61 mm d = 15 mm	l = 57 mm d = 15 mm
weight	57 g	52 g	55 g	55 g
item number	5002807	5101549	5006420	5102340
note	accessories available for distance measurement			



The thickness determination is based on an interferometric measurement. Broad-band infrared or visible light is focused onto the workpiece by our optical probes. In the coaxial con-

figuration the reflections from different surfaces are collected by the same optical probes and then analyzed spectrally. By Fourier Analysis of the interference spectrum the thicknesses of all layers are determined.

All interferometric CHRocodile units are equipped with one measuring channel and provide following technical specifications:

linearity	$3.3 \times 10^{-4} \times$ upper measuring range limit ³⁾
synchronization with external devices	trigger input, synchronizing output, 5 encoder inputs
interface	Ethernet, RS-422, 2 x analog (-10 V to +10 V, 16 Bit)
transfer rate	Ethernet (100 Mbit), RS-422 (up to 10 MBaud)
light source	SLD ⁴⁾
operating temperature	+5°C up to +50°C
dimension (width x height x depth)	220 mm x 110 mm x 125 mm
weight	2 kg
supply voltage	16 - 30 V DC (with separate power supply 90 - 264 V AC)
rated power	20 W

¹⁾ Bottom of optical probe to middle of measuring range | ²⁾ Decreasing accuracy for large incident angles

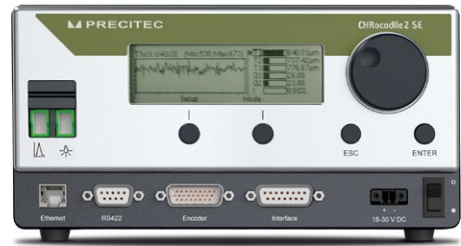
³⁾ CHRocodile 2 K: linearity - $6.6 \times 10^{-4} \times$ upper measuring range limit | ⁴⁾ CHRocodile 2IT HTW: light source - halogen lamp

VISIBLE LIGHT INTERFEROMETRY

CHROcodile UNIT	CHROcodile 2 S / CHROcodile 2SE ¹⁾	CHROcodile 2 S HS ¹⁾
measured value	distance, thickness	
measuring rate	up to 66,000 Hz	up to 10,000 Hz
measuring range	2 µm up to 180 µm	2 µm up to 150 µm
number of measuring channels	1	
synchronization with external devices	trigger input, synchronizing output, 5 encoder inputs	
interface	Ethernet, RS-422, 2 x analog (-10 V up to +10 V, 16 Bit)	
transfer rate	Ethernet (100 Mbit), RS-422 (up to 10 MBaud)	
light source	LED	
operating temperature	+5°C up to +50°C	
dimension (width x height x depth)	220 mm x 110 mm x 125 mm	
weight	2 kg	
supply voltage	16 - 30 V DC (with separate power supply 90 - 264 V AC)	
rated power	20 W	
item number	5007530 (CHROcodile 2 S) / 5007531 (CHROcodile 2 SE)	5100981
note	CHROcodile 2 SE: external coupler	measurement on absorbing surfaces



Thickness measurement of conformal coating in submicron range.



OPTICAL PROBE

measured value	thickness		
working distance ²⁾	27 mm	10.6 mm	18.1 mm
lateral resolution	20 µm	6.5 µm	25 µm
numerical aperture	0.1	0.2	0.1
measurement angle to surface 90° ³⁾	± 5°	± 10°	± 5°
dimensions (without fiber connector)	l = 54 mm d = 15 mm	l = 67 mm d = 8 mm	l = 40 mm d = 8 mm
weight	21 g	23 g	10 g
item number	5005000	5003517	5002947
note		optical fiber fixed on probe	extra compact, optical fiber fixed on probe

¹⁾ CHROcodile unit can switch between interferometric and chromatic confocal mode | ²⁾ Bottom of optical probe to middle of measuring range

³⁾ Decreasing accuracy for large incident angles

The given data was generated for a typical application and may be different given other circumstances. Furthermore misprints, changes and/or innovations may lead to differences in the listed measurements, technical data and features. Therefore all information is non-binding and technical data, measurements as well as features are not guaranteed.

Precitec 3D Metrology - measure more precisely with light.